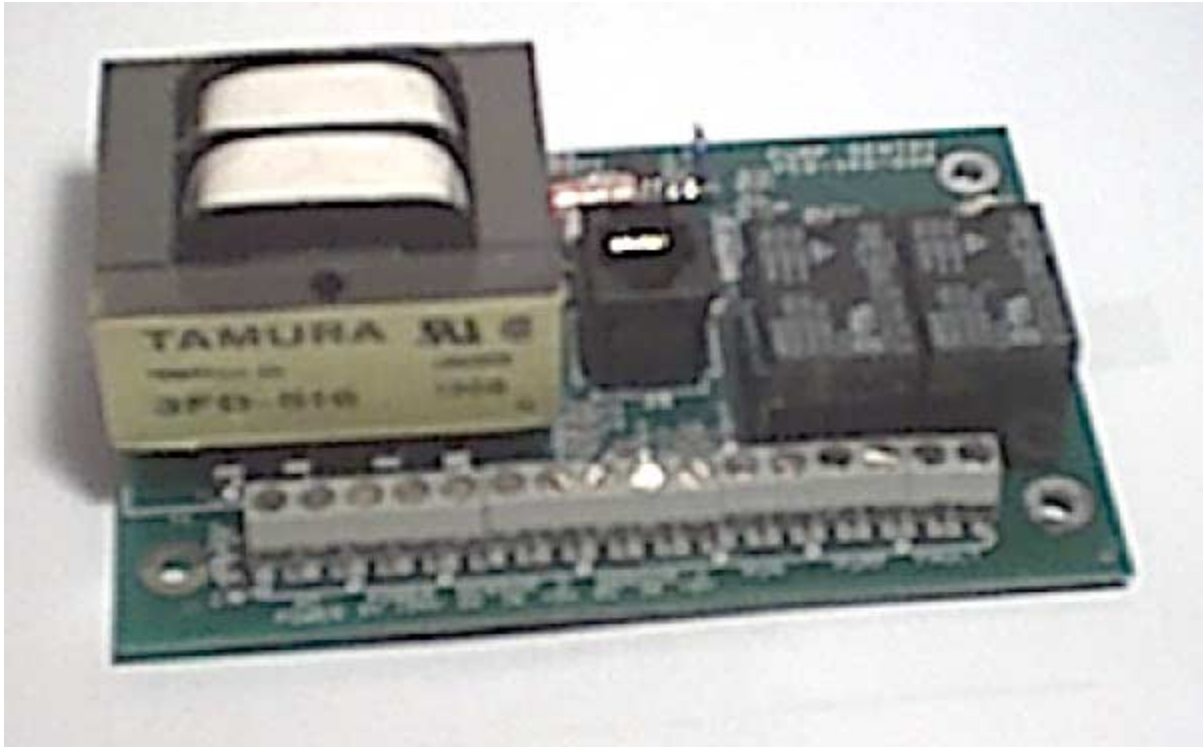


ProjectName: Boost Pump Control

ProjectNumber: F3060

Abstract:

The boost pump control is a liquid pump monitor system used to protect a pump from running dry by monitoring the inlet and outlet pressures. Typically used to assist freon compressors that have long pipes between the evaporator and condenser.



Description of Operation:

Standby mode - Whenever the run signal is removed from the input the pump relay will be turned off. The fault led and fault relay will remain in the last state they were in prior to the removal of the run signal.

Start up - On detecting the application of the run signal the control will use the current pressure readings as a base for determining current conditions. Once these readings have been saved the pump relay will be turned on. The pump is then given a programmed time (Startup) to attain a minimum pressure (Differential) also programmable. If the minimum pressure is not achieved within the programmed time the pump will be turned off, the fault led and fault relay turned on. The pump will be restarted after a delay (Shutdown) also programmable. The pump can be restarted up to n times (Restarts). If the pump is able to achieve the minimum differential the control will enter the run mode.

Run Mode - Once in the run mode the control will continue to monitor the pressure differential. If the pressure differential drops below the minimum for a period of time (Dropout) the control will go through the fault procedure and attempt to restart the pump. If the maximum number of attempts is made during one application of the run signal the control will stop attempting to restart the pump until the run signal is removed and reapplied or power is removed.

Software:

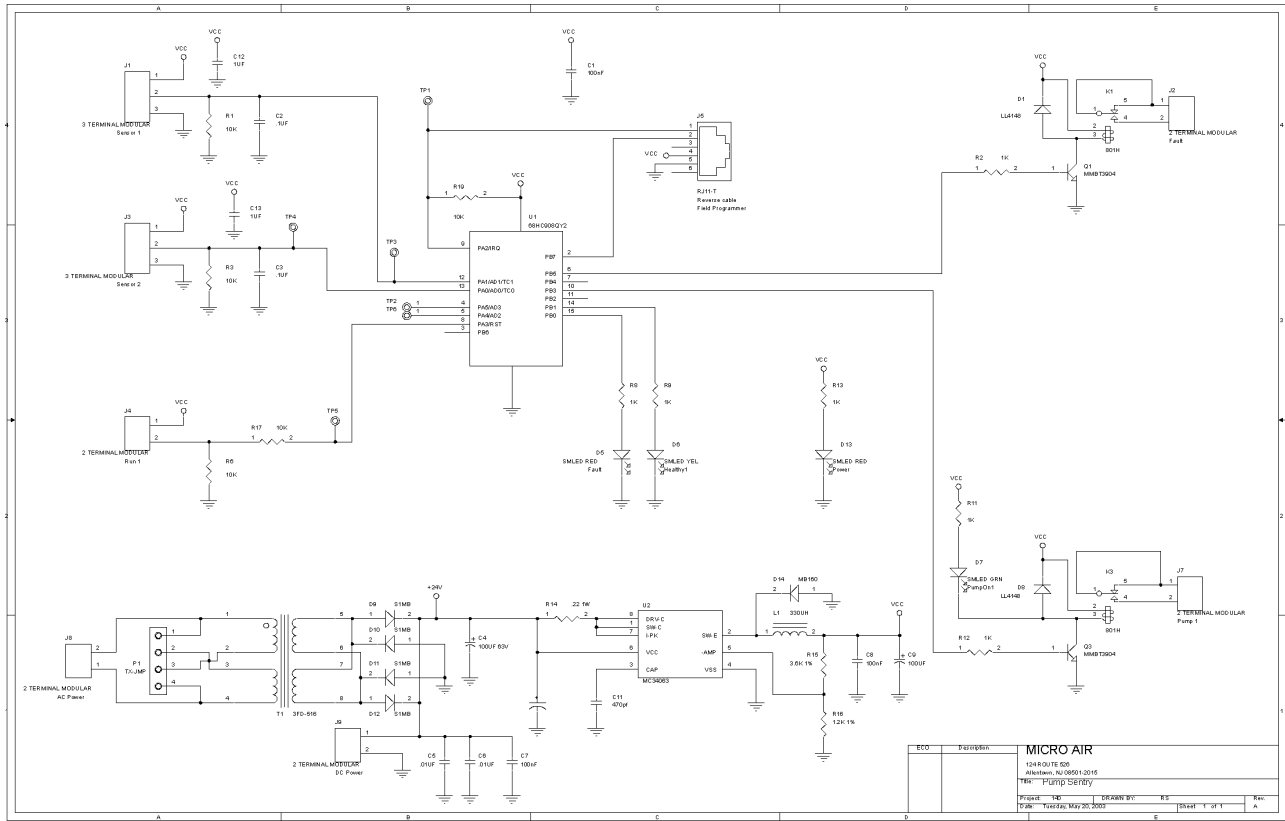
After reset the configuration registers are initialized to enable the external irq. The ports are initialized then initialized followed by the oscillator trim. The timer is then started, ram is cleared and the A2D hardware is turned on and initial pressure readings are taken and used to fill the pressure buffers.

Once the initialization is complete the program enters the main loop where it enables the interrupts for the timer and external IRQ, resets the cop watchdog and waits for the flag Tic to be set by the timer IRQ process which occurs every 10 milliseconds.

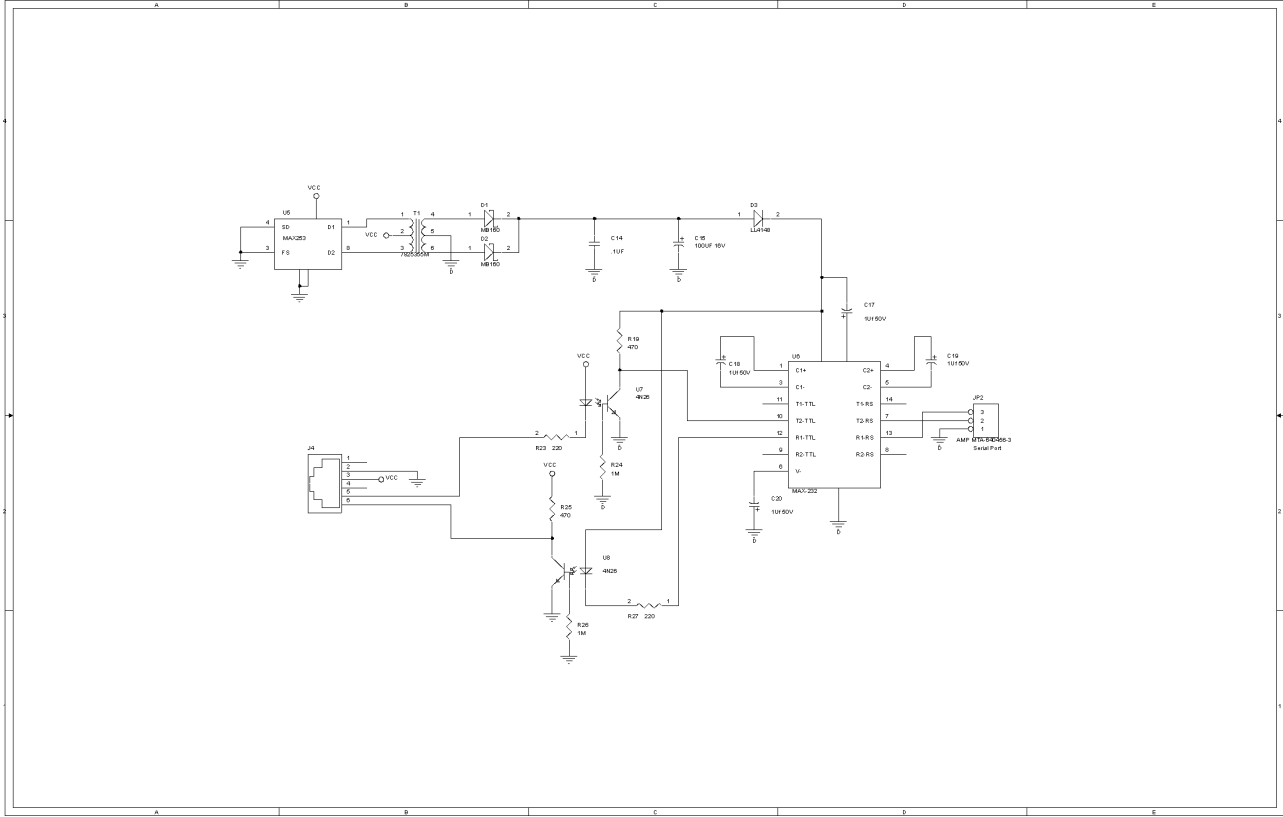
When the flag Tic is set the program exits the main loop to take new A2D readings. Ten of these readings are averaged together every tenth time the flag Tic is set. This average is then placed in a FIFO buffer.

After the A2D readings are taken the run signal is sampled and debounced. This signal must be held for 100 milliseconds in order to be recognized as valid. When fully debounced if the pump is required the oldest suction and discharged pressured are saved as a reference for subsequent readings until the run signal is removed.

At the end of this section the control checks the counter SerialOutClk for a zero value. SerialOutClk is incremented by the timer IRQ procedure. With the timer incrementing SerialOutClk every 10 milliseconds it will reach 0 once every 2.5 seconds at which point the control will output to the PC each of the five programmable parameters along with a 2's compliment checksum. If necessary the PC can send a new set of parameters to the control. The parameters must be in the same order and accompanied by a 2's complement checksum. Both use a baud rate of 9600. In order to keep cost of the pump monitor as low as possible the level shifting hardware is separate from the control.



Boost Pump Control Schematic



Adaptor Schematic